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Hitherto we have assumed the spot to be single. The typical spot-group originates through the development of a second spot to the east (following) the primary spot, the line joining the two making only a small angle with the equator. The polarities of the two principal spots (smaller companions are usually present) are opposite, and the hydrogen ($H\alpha$) flocculi surrounding a bipolar group resemble the lines of force about a bar magnet. Two alternative hypotheses may be offered to account for these phenomena. According to the first, the lower extremity of the vortex of the primary spot, lagging behind the upper extremity, turns up to meet the photosphere, thus producing a horse-shoe vortex. As in the case of single (unipolar) spots, the hydrogen and other high-level gases flow toward the two members of the group along the lines of force. According to the second view, the two vortices are independent, with nearly radial axes. The necessary criteria of selection can probably be found by a comparative study of the principal members of a bipolar group, special attention being directed to the inclination of the axes of the vortices to the line of sight (as given by the Zeeman effect), the direction of flow (inward or outward) of the vapors at different levels, and the relative temperature and pressure of the two spots.

GEORGE E. HALE.

THREE INTERESTING SPIRAL NEBULÆ.

A number of photographs have been made during the past year with the Crossley reflector of nebulæ hitherto unphotographed, and in the course of this work three nebulæ of rather unusual form have been discovered. Figure I shows the spiral nebula N. G. C. 5921 ($\alpha = 15^{\text{h}} 17^{\text{m}}.0$; $\delta = +5^{\circ} 26'$). It has a nebulous central star, and from this extends on each side a nearly straight line of matter from the ends of which spring two strong spiral branches; there are also a number of fainter spiral whorls. The central oval is about $1'.6$ long. The photograph from which the cut was made was taken on June 10, 1912, with an exposure of three hours. It somewhat resembles N. G. C. 1300 ($\alpha = 3^{\text{h}} 15^{\text{m}}.2$; $\delta = -19^{\circ} 46'$), shown in Figure II, which is a drawing made from a negative exposed two hours and ten minutes on September 16, 1912.

The nebula N. G. C. 7293 ($\alpha = 22^h 24^m.3$; $\delta = -21^\circ 21'$), which forms the frontispiece of this number, is a most interesting object, and, so far as I know, entirely unique among nebular forms.¹ Discovered before 1824 by HARDING, visual observations give absolutely no idea of its true form, and it is described in the N. G. C. of DREYER as !pF, vL, E or biN (Auw. 48). It is 13' in extreme diameter, making it the largest ring-formed object known, but from the original negative it is easily seen to be in reality about two turns of a helix. The negative from which the cut was made was exposed four hours and ten minutes on September 9, 1912. I would suggest that this interesting object be referred to as "The Helical Nebula in *Aquarius*."

HEBER D. CURTIS.

NOTE ON THE COMPANIONS OF SIRIUS AND PROCYON.

In the *Astronomical Journal* for July 31, 1912, Professor BARNARD publishes his measures of the companions of *Sirius* and *Procyon* made with the 40-inch refractor during the past two years. I have compared his measures of *Sirius* and also my own, made with the 36-inch refractor at about the same times, with the positions derived from LOHSE's orbit.² Tabulating the results, we have:—

Date	θ_0	ρ_0	— O—C —			
			$\Delta\theta$	$\Delta\rho$		
1911.07	87°.2	9".46	+0°.8	+0".23	BARNARD	7 ⁿ
1911.21	85°.2	9".38	—0°.8	+0".11	AITKEN	3
1912.07	84°.7	9".90	+1°.1	+0".32	BARNARD	5
1912.08	83°.6	9".58	—0°.2	0".00	AITKEN	2

It appears that the computed and observed angles are practically in exact agreement, but that the computed distances are systematically smaller than the observed. For my own measures, I find the average residual in distance for the seven years 1906-1912, inclusive, to be +0".11.

¹ Professors HOLDEN and SCHÆBERLE, from visual observations of the small planetary N. G. C. 6543 ($\alpha = 17^h 58^m.6$; $\delta = +66^\circ 38'$) in *M. N.* **48**, 388, 1888, suspected a similar helical formation of this planetary. They state, "... it appears to us at least probable that the real disposition of the brighter parts in space may be in the form of a helix." Careful examination of short exposure photographs, however, indicate that the structure of this planetary nebula is that of a very compact spiral, with two very strong whorls. Dr. BURNS, in *Lick Observatory Bulletin*, **6**, 192, has suggested a possible helical form for the Ring Nebula in *Lyra*.

² *Publikationen des Astrophysikalischen Observatoriums zu Potsdam*, **20**, II, 87, 1908.



FIGURE I.
THE SPIRAL NEBULA N. G. C. 5921.
Crossley reflector. Exposure 3h.

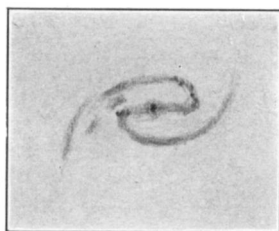


FIGURE II.
THE SPIRAL NEBULA N. G. C. 1300.
Drawn from a Crossley photograph.



THE HELICAL NEBULA IN *AQUARIUS*.
Crossley reflector. Exposure 4h 10m.